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Complexity of quantum uniform and nonuniform automata

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Abstract

We present two different types of complexity lower bounds for quantum uniform automata (finite automata) and nonuniform automata (OBDDs). We call them "metric" and "entropic" lower bounds in according to proof technique used. We present explicit Boolean functions that show that these lower bounds are tight enough. We show that when considering "almost all Boolean functions" on n variables our entropic lower bounds gives exponential (2c(δ)(n-log n)) lower bound for the width of quantum OBDDs depending on the error δ allowed. Next we consider "generalized measure-many" quantum automata. It is appeared that for uniform and nonuniform automata (for space restricted models) their measure-once and measure-many models have different computational power.